

FR/EN
WR SD

JAN 3 1985

MEMORANDUM

To: AWR, Matthews, Region 6
From: ~~ACTU~~ Regional Hydrologist, Region 6
Subject: Annual Water Use Report/Management Plan

The reports for Lake Andes NWR, Broken Arrow WPA and Karl Mundt NWR as well as Ft. Niobrara-Valentine NWR have been reviewed and found to be in order.

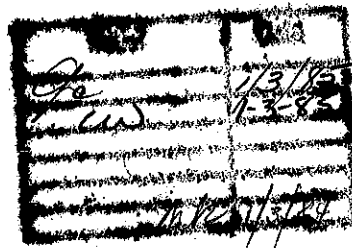
Please extend our thanks to refuge personnel for the effort expended in documenting water use and for the timely manner in which these reports were submitted.

If there are any questions, please contact Ginger Chesy at (303) 236-5395.

Cheryl Willis

bcc: RD rf
Circ rf (2)

EN:MChesy:mk:1/3/85



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ANNUAL WATER MANAGEMENT PROGRAM

Lake Andes National Wildlife Refuge, Lake Andes SD

Water Unit: Owens Bay

I. Introduction

The Owens Bay Unit is a 240 acre marsh unit, separated by a dike from the South Unit of Lake Andes. A stop log water control structure is located in the dike to allow water releases into Lake Andes.

Owens Bay, in addition to water from natural runoff, is maintained by a free-flow artesian well. The well, drilled in 1957, originally had a 1000 gpm flow and water right. Well shutdowns during the 1973 DVE outbreak resulted in casing destruction and new casing had to be installed. The new casing reduced the well opening from 12" to 8" and dropped the flow to approximately 450 gpm where it is presently stabilized. The present well flow, without adequate spring runoff, is unable to maintain the entire marsh because of a 39 inch average annual evaporation rate.

II. 1984 Water Conditions

Excellent spring rainfall filled Owens Bay to capacity. A total of 29.96" of precipitation was recorded from April 1 through October 30. Excess water drained into the South Unit of Lake Andes. The artesian well remained open throughout the year flowing at a rate of approximately 450 gpm into the Unit.

1984 Water Levels - Owens Bay

Date	Water Level
4/30	1442.62
5/31	1442.49
6/29	1343.08
8/01	1342.18
8/29	1441.85
9/30	1441.42
11/01	1441.62
Pool Bottom	1436.52

III. Ecological Effects Of The Past Year's Water Levels On Owens Bay

Stable water conditions as a result of the excellent moisture conditions in 1983 carried over through 1984. The number of waterfowl pairs decreased to 131 from the 149 counted in 1983. Excellent wetland habitat off-refuge probably accounted for the slight drop in breeding pairs. The brood habitat was good. Overwater nesters benefited by the stable conditions and reproduction was good. The muskrat population continued to expand and create openings in otherwise thick cattail stands. Fall use by migrant waterfowl was high until freeze up.

IV. 1985 Water Management Objectives

Water management activities for 1985 are to contain as much runoff as possible in Owens Bay. The artesian well will continue to run at full flow in order to offset annual evaporation.

ANNUAL WATER MANAGEMENT PROGRAM

Lake Andes National Wildlife Refuge, Lake Andes, SD

Water Unit: Broken Arrow Waterfowl Production Area

I. Introduction

The Broken Arrow WPA in Douglas County began as a 1660 acre tract purchased in 1977. Two drainage systems existed on the property when purchased. The Mud Lake Drain had an upstream watershed of 25,600 acres, while the second system, the New Holland drain had a 12,320 acre watershed. Five ditch plugs or low head dams, with concrete stop log control structures, were installed in 1979 along the drainage ditches, two on the Mud Lake ditch and the remaining three on the New Holland drain. Design specifications for the five dams are as follows:

Embankment Volume	³ YD	High Water Contour	Surface Acres	Acre-feet Impounded
Dam #1 -	76	497.6	6.2	5.7
Dam #2 -	755	497.6	27.9	82.6
Dam #3 -	2761	495.6	43.6	163.0
Dam #4 -	586	495.5	34.7	88.3
Dam #5 -	137	495.5	6.3	5.2
TOTAL			118.7	344.8

A water rights application was not filed with the State Water Rights Commission. Area office personnel at the time felt that since the project involved restoring drained wetlands a permit to impound water on this area was not required.

During 1984, the district received title to an additional 960 acres adjacent to the west boundary of Broken Arrow WPA. This tract has potential for more wetland development.

In October, 1984, a ditch plug consisting of approximately 900 cubic yards of fill with a stop log structure was placed down stream from dam site #2 on the Mud Lake drain. The stop log structure consists of a 6 foot CMP half round riser, 54 inches wide with a 36 inch outlet pipe. Approximately 30 acres of shallow wetlands will be restored. The SCS provided engineering assistance. With adequate runoff this wetland should fill in 1985.

SDDWRC
advised that
office personnel
a permit was
not required, in
1978.

A ditch plug with a 6 foot high, 48 inch diameter full round riser with stop logs was placed to separate pools created by dams #2 and 3. Previously water had been diverted from the Mud Lake drain through a natural cut into the New Holland drain before flowing over the stop logs at full pool capacity on dam #2. This will allow water storage up to the high water contour.

II. 1984 Water Conditions

Runoff from heavy snows and above normal precipitation amounts throughout the spring and early summer filled all impoundments to capacity. Stop logs were removed from dam #2 to prevent diverting water from the Mud Lake drain into the New Holland drain. Stop logs were also removed from dam #1 because of local complaints that impounded water was backing up to the grade of a nearby township road. Excess water was channeled through the emergency spillways of dams #3, 4, and 5. Only the emergency spillway on dam #5 suffered any erosion which was later repaired. Impoundment surface acres were reduced by late summer evaporation. Both drains ceased flowing by late summer.

III. Ecological Effects Of The Past Year's Water Levels On the Broken Arrow WPA

Dam #3, which had recently been repaired in 1983, provided excellent newly flooded habitat. Higher water levels resulted in increased use by double-crested cormorants and heron and grebe species. The number of waterfowl breeding pairs increased and the stable water conditions that prevailed during the summer benefited production. Some wintering habitat for pheasants was flooded because of full pool capacities. New wintering habitat will be provided once cattail stands become established around the pool perimeters.

IV. 1985 Management Objectives

A project proposal has been submitted to Ducks Unlimited for funding to construct 2-3 low head dams with control structures downstream from the existing dams. The project would restore additional wetlands that were drained. If the project is approved, DU will provide engineering assistance. The dams will provide additional permanent water for breeding waterfowl and for brood rearing. Until a complete survey is done, the exact number of dams needed cannot be determined. All will be similar to those already in place.

Water management plans for 1985 are to contain as much runoff as designed behind the six existing dams and the proposed dams on the new tract. Should any structure appear to be in danger of being damaged or any possibility of flooding private land develop, stop logs could be pulled to allow release of additional water down the drainage ditches into Platte Creek.

ANNUAL WATER MANAGEMENT PROGRAM

Lake Andes National Wildlife Refuge, Lake Andes, SD

Water Unit: Lake Andes

I. Introduction

Lake Andes is a 4730 acre meandered lake whose water level depends entirely upon annual runoff. Two dikes cut the lake into three units, the North, Center, and South. Stop log water control structures are located within each dike, however, the lack of a permanent water supply precludes any water level manipulations.

Drainage area size and surface acres for each unit of Lake Andes are shown below. Maximum and average depth figures were determined in 1962, the last time the lake was completely full.

Unit	Drainage Area Acres		Surface Acres of Water	Water Capacity (Acre feet)	Depth when full Max.	Avg.
South	2,000	23%	1,760	16,159	13.5	11.5
Center	11,000	14%	2,359	18,000	14.5	12.9
North	53,000	62%	611	3,015	10.5	9.1
TOTAL	84,800	100%	4,730	37,174	-	-

In 1922, Congress passed a bill establishing a high water elevation of 1437.25 feet msl for Lake Andes via the construction of an artificial outlet on the South Unit. This level was established following local complaints about flooding around the lake. The Fish and Wildlife Service received the right to flood the meandered lake bed of Lake Andes in an easement taken in 1939 from the State of South Dakota.

II. 1984 Water Conditions

Water conditions on Lake Andes were the best since 1962. Good water levels were carried over from 1983. An unseasonably cool, wet spring with 6.99 inches of precipitation recorded in April and another 3.42 inches in May brought all units up. The North Unit began to overflow the stop log structure in early April. In June, 10 inches of rain fell in just 8 days over much of the watershed area north of Lake Andes. On June 21, the most dramatic increase occurred when a heavy downpour, varying from 3-5 inches, produced local flooding. Garden Creek, which empties into the South Unit, overflowed its banks for approximately 24 hours. Flooding

on Andes Creek caused a rapid rise in the North Unit, which reached a peak elevation of 1439.44 on 6/22. The overflow spillway worked fine as long as the intakes were kept clear of debris. The water elevation in the Center Unit peaked at 1437.4 on 6/26. Elevations in the Center and South Units stabilized at 1436.1 feet msl by July 9 (1.15 foot below the outlet). Late summer evaporation dropped all elevations nearly one foot by October. An unusually late freeze up occurred on 12/2. With another wet spring in 1985, Lake Andes could fill to capacity.

1984 Water Levels - Feet MSL

Date	North Unit	Center Unit	South Unit
4/02	Ice Out		
4/09	1436.9		
4/30	1437.08	1433.42	1429.72
5/14	1436.86	1433.70	1429.74
5/31	1436.75	1433.68	1429.79
6/18	1436.84	1434.68	1430.70
6/22	1439.44	1437.40	1432.68
6/29	1437.80	1437.12	1434.70
7/20	1436.68	1436.10	1436.10
8/01	1436.52	1435.98	1435.98
8/29	1466.16	1435.50	1435.50
9/30	1435.80	1435.15	1435.15
11/01	1435.75	1435.28	1435.28
12/02	Freeze Up		
Pool Bottoms	1429.25	1427.00	1426.00

III. Ecological Effects Of Increased Water Levels In Lake Andes

The rapid increase in water levels had the following effects on Lake Andes wildlife and emergent vegetation:

- a. Waterfowl breeding pairs totaled 1161, down 12% from the 1326 counted in 1983. Recently flooded wetlands off-refuge provided better habitat. The same pattern dominated the fall migration, as the birds preferred to use shallow wetlands until late fall.
- b. Approximately 70% of the cattail stands were drowned out. Much of the waterfowl brood habitat was lost. By freeze up a once expanding muskrat population was in trouble, with isolated populations found near the few remaining stands of emergent vegetation.

- c. The woody lake perimeter habitat of Russian olive/cottonwoods was flooded to a depth of 3-4 feet and provided some brood habitat.
- d. Habitat for overwater nesting bird species was inundated in June destroying a high percentage of the nests. Colonies of black-crowned night herons and cattle egrets were wiped out in the South Unit, but successfully renested in Russian olive trees. The production of coots and eared grebes dropped significantly. Diving species of ducks found renesting habitat limited.
- e. The recently flooded vegetation provided excellent spawning habitat for an expanding Lake Andes fishery, consisting of largemouth bass, yellow perch, and bluegills. The significantly deeper pool depths will decrease the chance of winterkill.
- f. Local citizens are excited about the lake filling and its potential to once again support an excellent fisheries.

IV. 1985 Water Management Objectives

Management objectives for 1985 are to continue to contain as much runoff as possible in Lake Andes. With another wet spring and excellent runoff the water level could reach the 1437.25 foot msl level established by Congress. Water would overflow the outlet which flows into Lake Francis Case. In July of 1984, the outlet ditch was cleaned of any vegetation which could slow drainage flows. A fish screen was installed to prevent carp from entering Lake Andes.

ANNUAL WATER MANAGEMENT PROGRAM

Lake Andes NWR Complex, Lake Andes, SD

Water Unit: Karl Mundt National Wildlife Refuge

The Karl Mundt NWR borders the Missouri River in Gregory County. The only water on the unit itself are four small (less than 1 acre) stock ponds that are used in conjunction with the grazing program. There is also a free-flowing artesian well that provides domestic water for the refuge quarters. Some of the flow from the well is diverted from the house to a small 1/2 acre pond in order reduce the water pressure going to the house.

There presently is no active management of water on the Karl Mundt Refuge.